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The Chronological History and Taxonomic Variation of the Genus *Cupressus* (Cupressaceae) in India

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Abstract: Recent embryological evidence of studies of seedlings of *Cupressus* L. along with chemotaxonomic studies of heartwood components has demonstrated that *Cupressus lusitanica* Mill. did indeed originate from the country of India. In the mid-sixteenth century, Portuguese merchants established early trade routes between India and Portugal. The trade developed from the spice industry confirms Miller's (1768) original description that *Cupressus lusitanica* did indeed originate from India. Later authors suggested that *Cupressus lusitanica* cultivated in Portugal was introduced from wild populations of *Cupressus* in Mexico. However, this latter theory was never accepted by native botanist in the country of Mexico, including noted botanist *M. martinez* (1948). In fact, all *Cupressus* species in India seem to have a different embryology than that of all *Cupressus* species in Nepal, Bhutan, China and Vietnam (Silba, 1994).

Key words: *Cupressus*; Chronological history; Taxonomic variation

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The genus *Cupressus* occurs in the Himalayas from Chamba, in northern India, to Nepal, Bhutan, and through into Assam. The distribution is not continuous in the Himalayas and adjacent Tibet, but represents disjunct populations with separate species occurring in each country of the Himalayas (Silba, 1994). Embryological studies of seedlings show that all *Cupressus* species in India have 3-6 acutely shaped cotyledons in their seedlings. In contrast, all *Cupressus* species native to Nepal, Bhutan, China and Vietnam have seedlings with two bluntly obtuse shaped cotyledons (Silba, 1994; Gaussen, 1952; Ouden and Boon, 1978). In this regard, *Cupressus* species in the eastern Himalaya's along with those in China seem to share a closer relationship to the Mediterranean species *Cupressus sempervirens* L. than to the Indian species.

The occurrence of the genus *Crupressus* in the Himalayan region has been generally poorly documented. *Cupressus* were known to have been cultivated in Western Europe from the Himalayas in the mid and early 19th century, and particularly in France, Portugal and England. Yet, the ancient town of Shimla in northern India seems to be the likely origin of the introduction of *Cupressus lusitanica* to Europe. Merchants along the coast of eastern India could have easily transported seeds and plants from Shimla (or nearby Chamba) to the port of Goa. Hence, the introduction to Portugal in the early sixteenth century due to the spice trade do have considerable validity to the early cultivation of *Cupressus* in India.

Martinez (1948) demonstrated in his drawings and illustrations of leaf apices, position of gland groove (or pits), and branching patterns that *Cupressus lusitanica* Mill. Differed significantly from the Mexican species *Cupressus lindleyi* Klotzsch ex Endl. Jiminez (Thesis, Inst, Politec. Nac., Mexico, D. F., 1975) demonstrated a distinct chemotaxonomic difference, and found a lower percentage of chromatin (50 percent) in *C. lusitanica*, versus the chromatin percentage in *C. lindleyi* (58 percent). Zavarin *et al*. (1967) found similar chemical components in the heartwood of *Cupressus* in Portugal to *Cupressus torulosa* in India, and that the chemicals nootkatin and hydronootkatinol occured in both *C. lusitanica* and *C. torulosa* D. Don. Ntarajan *et al*. (1970) found similar chemical extracts in conifer leaves while examining the presence of biflavones, and found that *C. lusitanica* (under the Indian name *Cupressus glauca* Lamarck) had both hinokiflavones and isocryptomerin in its leaves as well as *Cupressus torulosa* D. Don from India. Therefore, it is logical to conclude that *Cupressus lusitanica* and *Cupressus torulosa* share a common origin from India. Indeed, the trees in Portugal are very close morphologically to the trees of *Cupressus torulosa* in northern India. According to the rules of the International Code of Botanical Nomenclature then *Cupressus lusitanica* must take

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precedence over the name *Cupressus torulosa*, and a new taxonomic combination is here in made.

Cupressus lusitanica Mill. subsp. ***Lusitanica***, Miller in Gard. Dict. ed. 8, n. 3 (1768), type specimen at the British Museum, from Miller's Chelsea Physic Gaeden, originally from cultivated material near Bussaco, Portugal. The trees in north India (Chamba to Shimla) occur at higher elevations, have narrower crowns with more pyramidal branching, the branches and leaves more often glaucous, and cones with protruding prickly umbos on the scales. These taxonomic differences in the northern and southern populations in India have also been noted by other European botanists (Chris Chadwell, Kohli Memorial Gardens, England, personal comment, 1994). Typical *Cupressus lusitanica* Mill. now can be regarded as native in northern India from Chamba to Shimla.

Cupressus lusitanica Mill. subsp. ***torulosa*** (D. Don) Silba et D. Z. Fu, combination nova.

Basionym: *Cupressus torulosa* D. Din, ex Lambert, Descr. Gen. Pinus, ed. **1** (2): 18 (1824). Type specimen from Kumaon Uttar Pradesh near Ranges, India at the Kew Herbarium, England.

Cupressus lusitanica Mill. subsp. ***torulosa*** differs in being distributed further south in the Himalayas, occurring in the area of Kumaon, Naini Tal and in the Almora Hills in the Siwalik Ranges. In this region, *Cupressus* forms a more spreading habit in its branches than the trees of northern India, the foliage is not glaucous green in adult plants, and the female cones are more globose with less conspicuous umbos. This latter subspecies does not occur in Tibet, nor Nepal. Yet, may be cultivated in Bhutan as evidenced by recent herbarium collections at Edinburgh, Scotland.

The *Cupressus* in Nepal is an altogether different species, namely *Cupressus karnaliensis* Silba (Silba, 1994). It differs in its dark green or nearly blackish green foliage, columnar habit and seedlings with two cotyledons (Silba, 1994; also see Allemand, 1979 account about Himalayan cypresses).

Other *Cupressus* in India include *Cupressus darjeelingensis* (Silba) Silba which seems to have an extremely limited occurance in India. It has long pendulous dranchlets like *C. cashmeriana* Carr. of central Bhutan, but differs in its leaves having a sunken glandular pit and its cones with elongated umbos on the scales. Recent herbarium collections at Edinburgh and Leiden confirm that *Cupressus darjeelingensis* is native to Mussoorie, India in the western Himalayas just south of the distribution of *Cupressus lusitanica* subsp. *lusitanica* in Chamba.

In the eastern Himalayas, *Cupressus assamica* Silba occurs on Mount Piri in Arunachal Pradesh and further east to the region near Hapoli and Ziro. This species has dark green foliage, with orange-bark on the branchlets, and the female cones are relatively small and glaucous when young. It appears close to *Cupressus lusitanica* and *Cupressus lusitanica* subsp. *torulossa*, but is widely separated from them geographically. *Cupressus assamica* has 3-6 cotyledons like all the other Indian species. and it has been confused with *Cupressus funebris* Endl. in the past.

Cupressus funebris Endl. does not occurs at all in the Himalayas, and is restricted to mainland of China in its distribution. *Cupressus* with pendulous branches that may be cultivated in Tibet include both *C. cashmeriana* (of Bhutan) and *C. darjeelingensis* (Silba) Silba of Mussoorie (N. India). In northern Vuetnam the *Cupressus* trees near Lang Son are smaller trees than the trees in China, the Vietnam plants are less pendulous. Moreover, the female cones in the Vietnam trees are much larger (to 2.5 cm. or mire, versus 1 to 1.5 cm. long) in the Chinese populations. Therefore, perhaps *Cupressus funebris* should be regarded as having a different subspecies in northern Vietnam.

Trees cultivated in England, at the Hillier Arboretum demonsrrate the vast differences in morphology from the trees in the Himalayas. Botanist Allen Coombes (personal comment, 2005) has noted the trees in cultivation and has also noted that *Cupressus* from the Himalayas should not be considered as just one continuous species from India and Nepal, Tibet and Assam.

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